(10) Die Entwickelungsgeschichte der Störe. [1869.] (*St. Pétersb. Acad. Sci. Bull.*, xiv. 1870, col. 317–325; *Rev. Sci. Nat.*, 4, 1875–76, pp. 146–151).

(11) Weitere Studien über die Entwickelung der einfachen Ascidien. [1870.] (*Archiv. Mikrosk. Anat.*, vii. 1871, pp. 101–130).

(12) Embryologische Studien an Würmern und Arthropoden. [1869.] (*St. Pétersb. Acad. Sci. Mém.*, xvi. 1871, No. 12).

(13) Ueber die Vermehrung der Seesterne durch Theilung und Knospung. (*Zeitschr. Wissensch. Zool.*, xxii. 1872, pp. 283–284).

(14) Zur Anatomie und Entwickelung von Thalassema. (*Zeitschr. Wissensch. Zool.*, xxii. 1872, p. 284).

(15) Ueber die geschlechtslose Fortpflanzung des Amarœcium. (*Zeitschr. Wissensch. Zool.*, xx. 1872, p. 285).

(16) Ueber die Knospung der Ascidien. (*Archiv. Mikrosk. Anat.*, x. 1874, pp. 441–470).

(17) Sur le bourgeonnement du *Perophora listeri*, Wiegm. [Trad.] [1874.] (*Rev. Sci. Nat.*, iii. 1874–75, pp. 213–235).

(18) Ueber die Entwickelungsgeschichte der Pyrosoma. (*Archiv. Mikrosk. Anat.*, xi. 1875, pp. 597–635).

(19) Du développement des Actinies. [Trad.] [1875.] (*Rev. Sci. Nat.*, iv. 1875–76, pp. 15–26).

(20) Du mâle planariforme de la Bonélie. (*Rev. Sci. Nat.*, iv. 1875–76, pp. 313–320).

(21) Weitere Studien über die Entwickelungsgeschichte des *Amphioxus lanceolatus*, nebst einem Beitrage zur Homologie des Nervensystems der Würmer und Wirbelthiere. (*Archiv. Mikrosk. Anat.*, xiii. 1877, pp. 181–204).

(22) Ueber die Entwickelung der Chitonen. Vorläufige Mittheilung. (Carus, *Zool. Anzeiger*, ii. 1879, pp. 469–473).

(23) Zur Entwickelungsgeschichte der Alcyoniden *Sympodium coralloides*, M.-Edw., und *Clavularia crassa*, M.-Edw. (Carus, *Zool. Anzeiger*, ii. 1879, pp. 491–493).

(24) Weitere Studien über die Entwickelung der Chitonen. (Carus, *Zool. Anzeiger*, v. 1882, pp. 307–310).

(25) Observations on the Development of Brachiopods. [In Russian.] (Moscow, *Soc. Sci. Bull.*, xiv. 1874, pp. 1 (*bis*)–40 (*bis*)).—[Abstract.] (*Archives Zool. Expér.*, i. 1883, pp. 57–76).

(26) Note on the author's journey to the Caspian Sea. [In Russian, 1869.] (*Kiev Soc. Nat. Mém.*, i. 1870, pp. 19–20).

(27) Note on the structure of the alimentary canal in the Dendrocœla. [In Russian, 1869.] (*Kiev. Soc. Nat. Mém.*, i. 1870, pp. 109–110).

(28) Contribution to the embryology of the shark, from observations on *Mustelus laevis* and *Acanthias vulgaris*. [In Russian.] (*Kiev Soc. Nat. Mém.*, i. 1870, pp. 163–187).

(29) Development of the ova in *Sterna-pis thalassemoides*, Otto. [In Russian.] (*Kiev Soc. Nat. Mém.*, i. 1870, pp. 287–290).

(30) Contribution to the embryology of *Amphioxus lanceolatus*. [In Russian.] (*Kiev Soc. Nat. Mém.*, i. 1870, pp. 327–338).

(31) Contribution to the embryology of the tortoise *Emys europaea*. [In Russian.] (*Kiev Soc. Nat. Mém.*, i. 1870, pp. 378–385).

(32) Preliminary report to the Society of Naturalists of the Vladimir University on measurements in the Black Sea. [In Russian.] (*Kiev Soc. Nat. Mém.*, iii. 1873; *Proc.*, pp. 33–37).

(33) Observations on the development of the Cœlenterata. [In Russian.] (Moscow, *Soc. Sci. Bull.*, x. No. 2, 1874, pp. 1 (*bis*)–38 (*bis*)).

(34) *Neomenia gorgonophila*. [In Russian, 1880.] (Moscow, *Soc. Sci. Bull.*, xxxvii. No. 1, 1881, pp. 181–186).

(35) Embryogénie du *Chiton polii*, Philippi, avec quelques remarques sur le développement des autres chitons. (*Marseille Mus. Ann.*, i. 1883, No. 5, 46 pp.).

(36) Étude sur l'embryogénie du Dentale. (*Marseille Mus. Ann.*, i. 1883, No. 7, 54 pp.).

(37) On the history of the development of the Chitons. Preliminary communication. [In Russian.] (*Zapīskī Novoross. Obshchest. Estest. Odessa*, Tom. viii. pt. 1, 1882).

(38) On the preparation of the organs of some insects, spiders and centipedes. [In Russian.] (*Zapīskī Novoross. Obshchest. Estest. Odessa*, xiv. pt. 2, 1889).

(39) Observations sur les organes excréteurs des animaux invertebrés. (*Zapīski Novoross. Obshchest. Estest. Odessa*, xiv. pt. 1, 1889).

(40) On the spleen of Mollusca. [In Russian.] (*Zapīskī Novoross. Obshchest. Estest. Odessa*, xv. pt. 2, 1890).

(41) Ein Beitrag zur Kenntniss der excretionsorgane der Pantopoden. (*St. Pétersb. Acad. Sci. Mém.* xxxviii. 1892, No. 12).

(42) Einige Beiträge zur Bildung des Mantels der Ascidien. (*St. Pétersb. Acad. Sci. Mém.*, xxxviii. 1892, No. 10).

(43). Une nouvelle Glande lymphatique chez le Scorpion de l'Europe. (*St. Pétersb. Acad. Sci. Mém.*, v. 1897, No. 10).

(44) Études anatomiques sur le genre Pseudovermis. (*St. Pétersb. Acad. Sci. Mém.*, xii. 1901, No. 4).

(45) Phénomènes de la fécondation chez l'*Haementeria costata*, Müller. [In Russian.] (*St. Pétersb. Acad. Sci. Mém.*, xi. 1901, No. 10).

(46) With Barrois (Jules), Matériaux pour servir à l'histoire de l'Anchinie. (Robin, *Journ. Anat.*, xix. 1883, pp. 1–23; *Ann. Mag. Nat. Hist.* xii. 1883, pp. 1–20).

(47) With Marion (A. F.), Études sur les Neomenia. [1881.] (Carus, *Zool. Anzeiger*, v. 1882, pp. 61–64).

(48) With Marion (A. F.), Sur le développement des Alcyonaires. (Paris, *Acad Sci. Compt. rend.*, xcv. 1882, pp. 562–565).

(49) With Marion (A. F.), Documents pour l'histoire embryogénique des Alcyonaires. (*Marseille Mus. Ann.*, i. 1883, No. 4, 50 pp.).

(50) With Marion (A. F.), Contributions à l'histoire des Solenogastres, on Aplacophores. (*Marseille Mus. Ann.*, iii. 1887, No. 1, pp. 76, 7 pls.).

(51) With Ovsyannikov (F. V.), Ueber das Centralnervensystem und das Gehörorgan der Cephalopoden. [1866.] (*St. Pétersb. Acad. Sci. Mém.*, xi. 1868, No. 3).

(52) With Shulghīn (M. A.), Zur Entwickelungsgeschichte des Kaukasischen Scorpions, *Androctonus ornatus*. Preliminary communication. [In Russian.] (*Zapīskī Novoross. Obshchest. Estest. Odessa*, xi. pt. 1, 1866, pp. 39–55).

And quite recent papers on leeches (Acanthobdellidæ) and on the curious worm-like Gastropods, the Hedylidæ of the Sea of Marmora and Black Sea, published in the *Transactions* of the Imperial Academy of Sciences of St. Petersburg (the latter since his death).

NOTES.

THE Berlin official *Reichsanzeiger* announces that the order "Pour le Merite" has been conferred upon Lord Avebury and Prof. A. Agassiz, of Harvard University.

THE Hugh Miller centenary will be celebrated at Cromarty to-morrow, August 22. At the public meeting addresses will be given by Mr. Arthur Bignold, M.P. (chairman), Sir Archibald Geikie, F.R.S., the Right Hon. James Bryce, M.P., Principal Rainy, D.D., and Prof. J. M. Clarke, of Albany, New York.

THE *Daily Mail* reports that millions of winged ants descended on the Bohemian watering-place of Teplitz in a dense cloud on Saturday, August 16. At Brussels also there were swarms of ants, and the streets in some places were so thickly strewn with their bodies that the firemen had to be called out to wash them away.

A REUTER message from Yokohama states that the small island of Tori Shima, which is one of a chain extending between the Bonin Islands and the main island of Japan, was overwhelmed by a volcanic eruption between August 13 and August 15. There were about 150 inhabitants, and the whole of them appear to have perished. The island is covered with volcanic débris and all the houses have disappeared. The eruption was still proceeding on August 18, together with a submarine eruption in the vicinity of the island, and passing vessels report that the place is dangerous of approach.

THE manager of the Eastern Extension, Australasia and China Telegraph Company sends us the following extract from a letter received from the superintendent at Banyuvangi, Java, dated July 6:—"The Rooang volcano, which is about thirty-five miles from

Banyuvangi to the west, and has the appearance of being much closer, is, as a rule, very quiescent, only a very slight column of smoke being visible. On May 1 it commenced to throw up large columns alternately of black and white cloud, the whole mountain being at times quite hidden with the cloud. This continued until May 4, when it again assumed its usual peaceful appearance. It is curious that this should have occurred about the same time as the big affair in the West Indies." Since about the end of April, reports of volcanic eruptions, earthquakes and other disturbances apparently connected with them have been received almost every day. It is suggested by the *Newcastle Daily Chronicle* that the numerous colliery explosions which have recently been recorded may have some relationship with the seismic disturbances, and that a commission should be appointed to bring together the records of eruptions and earthquakes with a view to determine whether they have any connection with the occurrence of explosions in coal mines. Whatever may be the result of such an inquiry, there are many indications that the present year is an abnormal one in several respects.

THE death is announced, from Vienna, of Dr. Leopold Schenk, formerly professor of embryology and author of a work on the artificial determination of sex by means of diet.

A REUTER message from Bulawayo states that further discoveries have been made in the great ruins at Zimbabye. Two ancient ascents leading up to the citadel have been found, and the citadel itself has been cleared. An old stairway was also discovered, and various objects, including gold bangles and pieces of pottery, were found. One of the passages which was penetrated for the first time is 994 feet in length.

WE learn from the *Times* that Prof. Barbosa Rodrigues, director of the Botanical Garden of Rio de Janeiro, has arrived in England on a short visit. The Brazilian Congress has voted a considerable sum for the printing of his work "Sertum Palmarum," in which he describes 160 species of palm trees, entirely new and discovered by himself in his journeys in the interior of Brazil for more than thirty years, the letterpress to be accompanied by large coloured plates drawn in the places where each species grows spontaneously.

SOME time ago it was decided by some of Mr. Nicholson's friends and colleagues to offer him, privately, on the occasion of his retirement from the Curatorship of the Royal Gardens, Kew, some tangible evidence of the high regard in which he is held. We now learn from the *Gardeners' Chronicle* that the committee formed to carry out the proposal received contributions sufficient to purchase several articles to remind Mr. Nicholson of his old friends, among them being a salver bearing this inscription:—"Presented to George Nicholson, V.M.H., late Curator of the Royal Gardens, Kew, by his friends and colleagues, who, while admiring his qualifications as a man of science and a gardener, have a warm appreciation of his worth as a friend. 1902."

The *Times* announces that the following prizes have been awarded for essays on subjects connected with tropical diseases:—(1) A prize of the value of 10*l.*, entitled the Sivewright prize, presented by Sir James Sivewright for the best article on "The Duration of the Latency of Malaria after Primary Infection, as proved by Tertian or Quartan Periodicity or Demonstration of the Parasite in the Blood," awarded to Dr. Attilio Caccini, assistant physician, Hospital of Santo Spirito in Sassia, Rome. (2) A prize of the value of 10*l.*, entitled the Belilios prize, presented by the Hon. E. R. Belilios, C.M.G., for the best article on "The Spread of Plague from Rat to Rat, and from Rat to Man by the Rat-flea," awarded to Dr. Bruno Galli-Valerio, professor in the University of Lausanne, Switzerland. The prize of the value of 10*l.* entitled the Lady Macgregor prize, presented by Lady Macgregor for the best article on "The best Method of the Administration of Quinine as a Preventive of Malarial Fever," was not awarded. The judges were Surgeon-General Roe Hooper, president Medical Board, India Office, Colonel Kenneth MacLeod and Mr. Patrick Manson, F.R.S.

AT the forthcoming meeting of the British Association the address of the president of the Section of Anthropology, Dr. A. C. Haddon, F.R.S., will deal with the wide subject of totemism, and may be expected to lead to discussion; other folklore papers are offered by Mr. T. N. Annandale, on the popular religion of the Malays of Patani; by Rev. J. H. Holmes, on the religious ideas and initiation ceremonies of the natives of the Papuan Gulf; by Mr. E. S. Hartland, on the stone of destiny at Jara, and the appointment of a king by augury; and by Mr. F. T. Elworthy, on perforated amulets. Archæology, especially British, will be well represented. Mr. W. J. Knowles has a paper on plateau-implements from interglacial gravels, and a series of exhibits illustrating the manufacture of stone implements; Miss Layard describes a new Palæolithic site at Ipswich; Messrs. Clinch, Fennell and MacRitchie discuss the significance of British underground dwellings of Neolithic and later periods; and Mr. Coffey describes the Irish equivalents of the Hallstatt period of culture, in relation to the introduction of iron in western Europe. There is an important paper on the types of British Neolithic pottery by the Hon. John Abercromby, and a full report of this year's excavations at Silchester and in Crete. Physical anthropology will be represented only by Prof. D. J. Cunningham's paper on the Irish giant, whose skeleton will be present, and by a few minor exhibits of an anatomical kind; but there will be several important papers in descriptive ethnography; on the Lolos of Szechuan, by Mr. Augustine Henry; on the Nagas, by Dr. Furness, of Philadelphia; and on the races of the Malay Peninsula, by Messrs. Annandale and Robinson. A paper by Dr. Graham on the mental and moral characteristics of the people of Ulster is likely to lead to some discussion. Important reports will be presented by the committees on the age of stone circles, on Canadian ethnography, and on the teaching of anthropology in Great Britain and elsewhere.

WE are glad to note the formation of an Imperial Vaccination League. The Vaccination Act of 1898 will expire at the end of 1903, and from this it follows that legislation of some kind will be necessary next year. The League desires mainly to assist the community to study carefully certain possible amendments of the 1898 Act. Foremost of these is the necessity for obligatory revaccination of school children at a specified age. This practice is universal in Germany, and to it the freedom of that country in recent years from epidemic small-pox must be assigned. The League will also consider the question whether the entire supply of glycerinated calf-lymph should not be guaranteed and regulated by some public authority. In Germany fifty-five millions of people are supplied by twenty-two State laboratories; Great Britain and Ireland, with forty millions of people, have but one. The League intends to put its views upon these subjects before members of both Houses of Parliament and to circulate literature. For this purpose it appeals for funds, which may be sent *inter alia* to Dr. Edwardes, at the offices, 53 Berners Street, W.

AN interesting address was given by Sir James Crichton Browne, the president of the Sanitary Inspectors' Association assembled last week at Middlesbrough. Sir James referred to the *rôle* played by flies in the propagation of disease. Leaving aside the researches concerning the part played by the Anopheles in malarial infection, he confined his attention to the common house-fly. "This most fearless and audacious of all creatures" is probably the carrier of many varieties of bacterial infection.

It appears that cultures of many pathogenic organisms have been obtained recently from the excreta of the common house-fly, *Musca domestica.* The *rôle* played by these insects in the dissemination of enteric fever in South Africa was referred to, and Sir James remarked that one of the collateral advantages of our campaign in South Africa might prove to be the opening of our eyes to the part played by flies as disease mongers. The enormous fertility of the ordinary fly forms one of the chief obstacles to its extermination; it has been calculated that one female fly may have 25,000,000 descendants during one season.

MESSRS. COOK, the tourist agents, have put forward a proposal to run an electric railway to the crater of Vesuvius from the Naval Arsenal in Naples to take the place of the funicular railway now used. The Faculty of Science in the University of Naples has forwarded a strong protest against the scheme to the Italian Government, on the grounds that it would interfere with the seismic and magnetic observations and records which are made at the University.

THE lecture delivered by Mr. J. Swinburne before the Incorporated Gas Institute, on the electrolysis of gas mains, is a valuable and impartial *résumé* of the whole subject. Few will disagree with the conclusion that the question is not really settled, and that although electrolysis undoubtedly takes place it is hardly possible at present to say whether it is serious or not. Mr. Swinburne urges the gas and water companies to watch carefully; should serious corrosion be observed some means must be found of making those who are responsible pay for the damage, though it is to be feared there will be difficulty in fixing the responsibility in towns, such as London, where there are a number of electric tramways and railways. The lecture is reprinted in the last two issues of the *Electrician.*

IT is proposed to work electrically that part of the New York Central Railway which runs through the city, the principal motive for the conversion lying in the fact that two miles of the track are in a tunnel. The scheme involves the electrification of thirty miles of track, at a cost of nearly three million pounds, and requires a power station with an output of 100,000 h.p. As a result of tests with a dynamometer car on a portion of the lines, estimates of the cost of working with different electrical systems have been prepared. These are embodied in a paper read by Mr. D. J. Arnold before the American Institution of Electrical Engineers. Local conditions have largely determined what system should be recommended, and that which works out cheapest has in consequence not been chosen. The one selected comprises a combined alternating- and direct-current generating station near the outer end of the line and a substation at the other end, with batteries in both. The alternate-current transmission is at 11,000 volts and the direct-current working pressure is 600 volts. The total cost with this system is estimated at 23·63 cents per locomotive-mile as against 24·18 cents with steam. The economy is little enough, and would not be sufficient to justify the conversion unless there were other considerations. The *Electrician* justly points out that the scheme, if adopted, can hardly fail to be merely the stepping-stone to the complete conversion of the whole railway.

A PAPER has been contributed to the Lombardy *Rendiconti*, xxxv. 15, by Dr. Edoardo Bonardi, in which the author asserts his disbelief in the existence of specific characters in bacteria, and considers that a curative serum has no rigorously specific action, but that its action in curing infectious diseases consists in its strengthening the animal organism against the attacks of disease germs.

FROM Prof. Garbasso we have received the reprint of a note communicated to the *Atti* of the Italian Electrotechnical Association on the condition under which two conductors arranged in multiple arc are equivalent to a single conductor when self- and mutual-induction are taken into account. A more general discussion of the discharge of a condenser by *n* wires arranged in parallel is given by the same author in the *Annalen der Physik*, 8.

IN acoustics it is common to measure large intervals of pitch in octaves and smaller ones in "commas." M. A. Guillemin proposes to adopt instead of these units the *savart* and the *millisavart.* By the savart is meant an interval of ten to one, which equals three octaves plus a major third. The millisavart, which is the thousandth part of the savart, represents the interval between two French standard diapasons giving one beat per second.

WE have received a reprint from the *Astronomical Journal*, for January, of Dr. G. Johnstone Stoney's paper on the effect of meteoric deposits on the length of the terrestrial day. It deals exclusively with the effects so far as they are due to an alteration of the moment of inertia of the earth, the object being to show that when the earth's compressibility is taken into account the increase in the moment of inertia is much smaller than would appear from calculations in which this influence is omitted.

IN a preliminary note contributed to the *Atti dei Lincei* 9, Dr. Quirino Majorana describes certain novel magneto-optic phenomena. The analogy of Kerr's phenomenon has suggested that when a substance possessing magnetic properties is placed in a field of force, the state of strain set up should give rise to double refraction. Dr. Majorana has investigated this magnetic double refraction, which he finds exists in a small degree in ferrous chloride and to a greater extent in dialysed iron or ferric oxide in colloidal suspension. But another phenomenon was observed, particularly in solutions of ferric chloride that had acted on hydrates of iron. This phenomenon consisted in a rotation of the plane of polarisation when this plane was neither parallel nor normal to the lines of force. In each case the direction of the incident light was perpendicular to the lines of force, and if the direction of polarisation was either parallel to or perpendicular to the lines of force, no phenomenon of the kind considered was observed, while, on the other hand, the effect was a maximum when the direction of polarisation made an angle of 45° with these lines, and it consisted in a rotation of the plane of polarisation which the author describes as positive when its direction is towards the lines of force. For this phenomenon the name of bimagnetic rotation is proposed.

THE report of the director of the Liverpool Observatory for the year 1901 has been published, by order of the Mersey Docks and Harbour Board, and contains the usual daily results of meteorological and other observations, which are the more valuable from the fact that they have been continued and carefully prepared for a long series of years. The Observatory lies within the area of the usual tracks of our prevalent westerly gales, and this is doubtless one reason for the special attention that is given to wind observations; these embrace anemometrical records of the horizontal motion of the air and the extreme pressure on the square foot. In addition, the tables show the maximum daily velocities recorded on a Dines's pressure-tube anemometer, and thus afford a valuable check on the registrations of the ordinary instruments. In addition, to the regular work of a first-class observatory we observe that telegrams are forwarded daily to the Meteorological Office for use in the preparation of weather-forecasts and storm-warnings, and that special observations of clouds are supplied in connection with the monthly international balloon ascents, which are frequently noticed in our columns. The earth disturbances that have been registered during the year have also been carefully collated.

We have received vol. xliii. part 2 of the *Annals* of the Astronomical Observatory of Harvard College, containing observations and investigations made at the Blue Hill Meteorological Observatory at Massachusetts in the years 1899 and 1900 under the direction of Dr. A. Lawrence Rotch. The first five tables include the observations made twice daily, together with summaries of them both at the base and valley stations, and a summary of visibility of objects in different azimuths; all these refer to the year 1899, while similar information is brought together in tables vi. to x. for the year 1900. Tables xi. to xiii. give general summaries for the lustrum 1896–1900, and table xiv. is devoted to phenomena which show the advance of the seasons for the 15 years 1886–1900. Appendix A. contains a very interesting study of the visibility of distant objects 18 to 40 miles away in different azimuths, based on observations made during the years 1896–1900. A very valuable series (1851–1900) of temperature observations made at Milton is discussed in Appendix B.

In No. 3 of vol. ii. of the *Journal of Hygiene*, Dr. Ritchie continues his interesting *résumé* of "Current Theories on Immunity." Mr. Irons discusses the value of neutral-red in water-examination, and concludes that used alone this method is likely to give misleading results. Dr. Savage, in an interesting paper on the presence of the *Bacillus coli* in drinking waters, gives some useful data for estimating the significance to be attached to this organism. Post-scarlatinal diphtheria is dealt with by Dr. Pugh in an exhaustive paper; vital statistics are represented by Dr. Hayward, who writes on the construction and use of life-tables; and the diseases of tropical countries are dealt with by Major Aldridge, R.A.M.C., and Dr. Stanley, who contribute papers on "Enteric Fever and Sewage Disposal" and on "Beri-Beri" respectively, and the number concludes with an obituary notice on Dr. Thurburn Manson. Every number of this comparatively young journal hitherto published covers a wide field and contains many valuable contributions.

Having regard to the varied opinions that have been expressed relative to the thermal death point of the tubercle bacillus in milk (see Nature, vol. lxiii. pp. 166, 205 and 353), a paper by Mr. H. L. Russell (*Philad. Med. Journ.*, November 16, 1901) on bovine tuberculosis and milk supplies is worthy of note. Milk was infected with tubercle bacilli from cultures and was then pasteurised in a rotating commercial pasteuriser, and after treatment the milk was tested by inoculation. It was found that even a ten-minutes' exposure at 60° C. was sufficient to destroy the vitality of the tubercle bacillus so thoroughly that no trace of disease developed in the inoculated animals. In an open vessel, however, a fifteen minutes' exposure had no effect. This difference seems to be due to the film which is formed when milk is heated in an open vessel. Provided the pasteuriser be closed so that no film forms, a temperature of 60° C. acting for not less than ten minutes, preferably for 20–30 minutes, is sufficient to destroy the infective properties of tuberculous milk, while such treatment hardly alters the flavour and nutritive qualities.

The voluminous reports annually issued by the various experimental stations as well as by the central Government are proofs of the fostering care exercised by the State for agriculture in the United States. In an excerpt from the "Eighteenth Annual Report of the Wisconsin Agricultural Experimental Station," 1901, which has recently reached us, among other valuable papers is one by Messrs. Babcock and Russell upon the "Causes Operative in the Formation of Silage," and the view is expressed that the changes which lead to silage production are hardly explicable on the theory that these are caused by the growth of micro-organisms, but rather that the internal processes of the living plant cells themselves are the factors which inaugurate the series of changes that result in the formation of typical silage.

To the July number of the *New Phytologist*, Prof. F. W. Oliver contributes an article on "Gymnospermous Seeds," in which he traces a suggestive connection, possibly phylogenetic, between the fossil types Lagenostoma and Pachytesta and the existing genus Torreya. The examination of rhizomic material of the unique fern *Matonia pectinata* collected by Mr. Tansley on Mount Ophir forms the subject of some notes by Miss G. Wigglesworth. The arrangement of concentric steles differs in some respects from the specimen collected in Borneo and described by Mr. Seward. The notice by Mr. V. H. Blackman of a recently published monograph, by Mr. H. Lohmann, on Coccoliths will be useful to those botanists to whom the original memoir is not available. The revised classification of the green Algæ undertaken by Mr. F. F. Blackman and the editor is continued. It was the expressed desire of the editor that the correspondence columns should form a medium for the communication and discussion of educational matters. The attention of teachers may well be directed to the account of a trial of the heuristic method in a secondary school, as well as to a letter which points out the adaptability of systematic botany to meet the requirements of instruction for children.

We regret that in our last week's issue the name of the fossil Austrian rhinoceros described by Prof. Toula was given as *Rhinoceros sumatrensis* instead of *R. hundsheimensis.*

We have received a useful paper on American insects injurious to agriculture and horticulture and insecticides, by Mr. C. P. Gillette, forming *Bulletin* No. 71 of the experiment station of the Agricultural College of Colorado.

In a paper published in the *Memorie* of the Royal Institute of Lombardy (vol. xix. part 7) Dr. A. Negri claims to have discovered in the red blood-corpuscles of mammals a special substance which is abundant during fœtal life and gradually diminishes with advancing age.

Those remarkable horned ungulates the titanotheres, of the Oligocene of North America and Eastern Europe, are shown by Prof. Osborn (*Bull. Amer. Mus.*, vol. xvi. art. 81) to be divisible into four branches, or "phyla," characterised by the proportion of the length to the breadth of the skull, and in some cases by the relative length of the limbs. In this respect they resemble the rhinoceroses, the various "phyla," as in the case of the latter, being regarded by the author as representing as many genera.

Prof. Osborn's studies of the groups just referred to have led him to take into consideration (*Bull. Amer. Mus.*, vol. xvi. art. 7) the morphological importance of length or shortness in the skulls of mammals—dolichocephalism and brachycephalism—and he concludes that both these features are characteristic of specialised types, the former condition being (as in the horse) often, although not invariably, connected with length of limb and neck, and adaptation to speed, while brachycephalism may be correlated with short limbs and an abbreviated neck. Exceptions to this rule, as exemplified by the cats, are due to special adaptive causes. It may be added that, in a paper published in the *Comptes rendus* of the late Geological Congress at Paris, Prof. Osborn figures a restoration of an American ancestral form of the horse nearly related to the English Eocene Hyracotherium; the animal is represented as fully striped.

In their recently issued Report the Royal Commissioners strongly urge the necessity for a central authority to have control of the whole of the salmon fisheries of Great Britain, or even of the United Kingdom. As a temporary measure a controlling authority of sufficient independence might be obtained by a modification of the present departmental arrangements in each of the three countries of the kingdom; but a single department to have charge of all questions connected with salmon-fishing in both seas and rivers is what is really wanted. Whether, however, the control be triple, dual, or single, it is essential that the holder of the office should himself be an expert on matters connected with salmon and salmon-fishing, and that his time should not be frittered away by attention to official details. The second section of the report deals with the life-history of the salmon, which is set forth in considerable detail. The Commissioners point out many deficiencies in our knowledge of this subject, such as whether fish entering rivers at different seasons of the year frequent particular branches or parts of the main river at spawning time. Information is likewise much needed with regard to the migration of kelts, and still more so concerning the history of the fish, both in its immature and adult condition, during its sojourn in the ocean. Experiments have shown that while a certain number of fish return to the rivers they left, others seek fresh spawning-grounds; and it will be obvious that fuller information on this point is of prime importance before steps are taken for the improvement of the fishery in any given district. In regard to the general idea of the deterioration of salmon-fisheries, the Commissioners are extremely cautious, stating that "it is useless to attempt to submit the popular belief that there has been a deterioration to any severe test. We can only accept the fact that such belief exists."

THE parliamentary Blue-book just issued on the working and expenditure of the British Museum for the past year shows that important additions have been made to the natural history collections at South Kensington, and considerable improvements effected in regard to the arrangement of the specimens exhibited to the public at that branch. It is satisfactory to learn that, in cooperation with the Trustees, the Egyptian Government vigorously carried on the survey of the fishes of the Nile during the year, nearly 700 miles of the river having been examined, resulting in the acquisition of several new generic and specific types. In the spring of 1901 Dr. Smith Woodward was despatched by the Trustees to explore the well-known mammaliferous beds of Pikermi, Attica, with the result that a fine series of remains from this horizon (previously very poorly represented in the collection) was acquired for the Museum. During a visit made to the Fayum district of Egypt in company with Mr. Beadnell, of the Geological Survey of Egypt, Dr. Andrews was fortunate enough to be the joint-discoverer of a hitherto unknown Tertiary vertebrate fauna of remarkable interest. Collections were also made under the auspices of the Trustees in Tripoli. In the Museum itself a section of economic zoology has been established. Among other acquisitions, the collection has been enriched by the magnificent series of birds' eggs bequeathed by the late Mr. Crowley, as well as by the gift of Lord Walsingham's unrivalled cabinet of micro-Lepidoptera and library pertaining to the same. The elephant-seal presented by Mr. Walter Rothschild is likewise a notable addition, which is exhibited in a case (also the gift of the same benefactor) with the Antarctic seals presented by Sir G. Newnes. The series of domesticated animals has been largely increased; and much progress has been made in arranging and mounting the collection of recent mammals and birds according to modern ideas. The insect collection—both in the public galleries and in the study rooms—has likewise claimed a large share of attention on the part of the staff. Indeed, the whole Natural History Branch of the Museum is to be congratulated on a good record of progress.

THREE pamphlets for the information of the islanders have recently been published by the Imperial Department of Agriculture for the West Indies. No. 14, by Mr. Maxwell-Lefroy, deals with "Screw Worm in Cattle at St. Lucia." In October last it was reported to the Department that a "fly maggot" was causing injury to cattle in the island. Mr. Hudson, the agricultural instructor, made careful observations of the habits of the fly and the extent of the injuries it inflicted, and Mr. Maxwell-Lefroy, on the suggestion of the administrator, visited St. Lucia to investigate the matter personally. The fly proved to be the "screw worm" of the southern United States, and also widely distributed in the West Indies. The pamphlet is devoted to the life-history of the worm, its mode of attack, the treatment of the wounds, prevention, &c. No. 15 is entitled "Plain Talk to Small Owners at Montserrat," being the substance of an address to the small cultivators in the island by Mr. Watkins, the Commissioner of Montserrat. In a small compass much information is conveyed in simple language on the value of the soil, manuring, the cultivation of foodstuffs for home consumption and for export, the regulation of the quality of fruit for exportation, bee-keeping and other subjects. No. 16 is by the same authority, "Hints on Onion Cultivation," also an address to the small cultivators of Montserrat. Based on experiments carried on during the past two years on the island, the prospects of the onion industry are considered to be distinctly promising, and this little brochure of twenty-five pages, which gives the essential particulars at every stage, from the selection of soil and seed to harvesting, packing and shipping, should prove invaluable, not only to the onion growers of Montserrat, but also to those of the other islands where the industry is being introduced.

FOR several years past explorations have been carried on by the Geological Survey of Canada in the North-West Territory, chiefly in the Belly River formation of Assiniboia and Alberta. This formation underlies the Fox Hills-Ft. Pierre Group, and is, therefore, Mid-Cretaceous, as distinguished from the Upper Cretaceous Laramie of Wyoming and Colorado, which overlies these marine beds. It thus enables an examination to be made of the characters of the Mid-Cretaceous land fauna of North America. The fossils have been collected by Mr. Lawrence M. Lambe, who has also prepared and figured them. The manuscript report upon this collection, entitled "On Vertebrata of the Mid-Cretaceous of the North-West Territory," has just been completed under the direction of Prof. Osborn. It includes two parts, the first a general introduction entitled "Distinctive Characters of the Mid Cretaceous Fauna," by Prof. Osborn, the second entitled "New Genera and Species from the Belly River Series, Mid-Cretaceous," by Mr. Lambe. It will be illustrated by twenty-one plates and a large number of text figures, and will appear from the press of the Canadian Geological Survey early in the autumn. The comparison of these Belly River Dinosaurs, especially the Iguanodonts and horned Dinosaurs or Ceratopsia, with those of Montana appears to demonstrate that a part at least of the Montana fauna is contemporaneous with the Belly River and represents an older horizon than the Laramie of Wyoming described by Marsh. The Belly River contains some of the older Jurassic families, which, so far as known, are wanting in the Laramie. The Montana fauna has hitherto been regarded as contemporaneous with the Wyoming and Colorado Laramie fauna, but there do not appear to be adequate grounds for this opinion in the vertebrates now known.

IN the April number of the *Journal of Physical Chemistry* is a paper by Mr. J. E. Mills in which several interesting applications of the kinetic theory of gases are made. By considering the transition from the liquid to the gaseous state in a particular way, an equation is obtained in which all the quantities are measurable, and it affords an experimental test of the assumption that the molecular attraction varies inversely as the square of the distance from the molecule and does not vary with the temperature. This assumption is found to be in agreement with the experimental data as tested by the equation. It is further shown in the paper that the molecular attraction differs from the attraction of gravity in being determined primarily by the chemical constitution of the molecule and not by its mass.

IN the July number of the *American Chemical Journal*, Messrs. Morse and Frazer give an account of their experiments on the preparation of cells for the measurement of high osmotic pressures. Osmotic-pressure determinations are well known to be attended with considerable difficulties, and the number of experimenters who have succeeded in carrying out the measurement of even low osmotic pressures is comparatively small. Specially constructed porous cells made of fine materials, very uniformly mixed and hard burned, were employed, and the semipermeable membranes were produced in these by electrolysis. The electrical resistance of the membranes so obtained varied very considerably, the lowest resistance being about 3000 ohms and the highest more than 200,000 ohms. From the observations made by the authors it appears that high-resistance membranes are those which are requisite for successful osmotic-pressure measurements, but no certain method of obtaining such membranes has been discovered. Experiments were carried out with half-normal and normal cane-sugar solutions. For the former the osmotic pressure was found to be about 13·5 atmospheres, and for the latter a lower limit of 31·4 atmospheres was determined. It is extremely interesting to note that this osmotic pressure of more than thirty atmospheres was developed within two hours of commencing the experiment, and that the membrane within the cell had a resistance of more than 200,000 ohms.

ALTHOUGH the electrochemical equivalent of silver has been the subject of several very careful investigations, the results obtained by different experimenters indicate that the quantity of silver deposited by a given quantity of electricity is dependent to a certain small extent on the form of voltameter and on the conditions under which this is employed. Messrs. Richards and Heimrod (*Zeitschrift für physikalische Chemie*, vol. xli. p. 302) have investigated minutely the cause of these differences, and find that the most important disturbing factor in the ordinary silver voltameter is the formation of a complex silver ion at the anode which diffuses towards the kathode, and by its decomposition increases the quantity of silver deposited at the kathode. An improved form of silver voltameter is described in which the anode and kathode are separated by a porous cell which prevents the diffusion of the anode solution to the kathode, and the accuracy of the results obtained by the use of this instrument is demonstrated by several series of experiments. As a result of this investigation it appears that the electrochemical equivalent of silver as determined by Lord Rayleigh's voltameter is at least ·05 per cent. too high, and that the quantity of electricity associated with one gram equivalent must now be taken as 96,580 coulombs.

The additions to the Zoological Society's Gardens during the past week include a Geoffroy's Cat (*Felis geoffroii*) from Paraguay, presented by Dr. Jose Carlos Rodriguez; a Somali Ostrich (*Struthio molydophanes*) from East Africa, presented by Mr. A. Marsden; two Lion Marmosets (*Midas rosalia*) presented by Miss E. M. Unwin; a Sykes's Monkey (*Cercopithecus albigularis*) from East Africa, a Macaque Monkey (*Macacus cynomolgus*), a Roofed Terrapin (*Kachuga tectum*), a Hamilton's Terrapin (*Damonia hamiltoni*), four Bungoma River Turtle (*Emyda granosa*) from India, a Moustache Tamarin (*Midas mystax*) from the Upper Amazons, four Long-necked Chelodines (*Chelodina longicollis*), two Vulpine Phalangers (*Trichosurus vulpecula*) from Australia, nine Tigrine Frogs (*Rana tigrina*) from the East Indies, a Californian Toad (*Bufo boreas*), four Pennsylvanian Mud Terrapins (*Cinosternon pennsylvanicum*) from North America, two Blackish Sternotheres (*Sternothoerus nigricans*) from Madagascar, a Lesueur's Water-Lizard (*Physignathus lesueuri*) from Queensland, two Black-pointed Teguexins (*Tupinambis nigropunctatus*) from South America, deposited; a Hoolock Gibbon (*Hylobates hoolock*) from Assam, purchased; a Crested Porcupine (*Hystrix cristata*) born in the Gardens.

OUR ASTRONOMICAL COLUMN.

A NEW REGISTERING ACTINOMETER.—M. G. de Fontenoy, of Paris, communicates to the *Bulletin de la Société Astronomique de France*, of August, a description of a novel registering actinometer which he has made and has found to act consistently.

The record is produced by the sunlight acting on a sensitised roll of paper fastened to an inner cylinder in the usual way, but in order to differentiate the varying intensities of the actinic effect, the light is allowed to act on the sensitised surface through a series of small windows, pierced in an outside cylinder of thin brass, which are equal in area and equidistant, but have different degrees of transparency. The whole instrument is rotated so that the common axis of the cylinders is always at right angles to the path of the sun's rays, and the inside cylinder is rotated by clockwork once in every twenty-four hours.

The paper is divided into equal spaces, representing hours, by a series of lines drawn on its surface perpendicular to the direction of its rotation, and a reproduction of one of the charts resulting from the exposure and working during one day in June plainly shows the traces made by the light which passed through the various windows; the longest trace (*i.e.* the one which is shown for the greatest number of hours) is the one which was formed by the light which passed through the most transparent window, the shortest is the one due to the light which passed through the most opaque window. By joining the ends of these traces one gets a curve, the integration of which gives the total amount of light registered during the twenty-four hours if one has previously determined the actinic constant for each window by submitting the instrument to the action of a standard light.

SOLAR PHENOMENA DURING 1901.—The "Commission Solaire" of the Société Astronomique de France has published the observations of sun spots and faculæ during 1901.[1]

Numerous observers scattered all over the globe make these observations and then submit them to the commission. Observations were made on 357 days during the year 1901, and it is hoped that, with the assistance of several recently enlisted volunteers, a complete record will be obtained for this and future years.

During 1901 twelve separate groups of spots, including 392 individual spots, were observed, the sun presenting a spotted surface on sixty days out of the 357 days of observation.

It is recommended by the secretary, M. F. Bouet, that members should also record the barometric pressure, the temperature, and the state of the surrounding atmosphere at the same time that they record the numbers of solar spots and faculæ.

A DARK SPOT ON JUPITER.—In a letter to the *Observatory* Mr. Theodore Phillips describes the movements of the dark spot which was observed in the neighbourhood of the red spot last year. On June 19 this year it was observed than an enormous area of dark material, extending for 35°, followed the *f* "shoulder" of the red spot, and on June 26 a dark spot was observed close to the *p* "shoulder," or *west*, of the red-spot hollow.

Mr. Phillips asks, "How did it arrive at its present position?" and then discusses the various solutions to the question, finally arriving at the conclusion that the dark material must have been diverted to the south by the red spot, and, after passing that obstruction, have regained its former latitude. As there is still a portion of the dark area to the east of the red spot, it would be advisable for observers to pay special attention thereto, as valuable additions to our knowledge of Jovian phenomena may thereby be secured.

Mr. Phillips also records an apparent acceleration, of late, in the velocity of the red spot.